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ATSC 3.0: The Next Revolution in Broadcast Video

You may know that the standard for broadcast television video since the digital conversion a few years ago is known as ATSC, which stands for Advanced Television Systems Committee, the name of the body responsible for formulating the standard (the analog standard in the U.S. and Canada was NTSC, for National Television Systems Committee). Almost as soon as the FCC and international standards bodies approved the initial ATSC standard, work began on a successor. ATSC 2.0 was nearly dead before it got off the ground, though. The rapid pace of technology meant that a standard focused on advanced video compression, targeted advertising, better programming guides, and video on demand was outpaced by the marketplace before it could be formulated. That meant work quickly focused on ATSC 3.0, and that new standard will be coming to your TV in the next two years. So, get ready and we'll have a look at what that means.

Table 1. Initial ATSC 3.0 Markets in the US

Atlanta, GA
Austin, TX
Baltimore, MD
Boston, MA
Charlotte, NC
Chicago, IL
Cincinnati, OH
Cleveland-Akron, OH
Columbus, OH
Dallas-Ft. Worth, TX
Denver, CO
Detroit, MI
Greenville-Spartanburg, SC
Asheville, NC
Hartford-New Haven, CT
Houston, TX
Indianapolis, IN
Kansas City, KS-MO
Las Vegas, NV
Los Angeles, CA
Miami - Ft. Lauderdale, FL
Milwaukee, WI
Minneapolis - St. Paul, MN
Nashville, TN
New York, NY
Orlando-Daytona Beach-Melbourne, FL
Philadelphia, PA
Phoenix, AZ
Pittsburgh, PA
Portland, OR
Raleigh-Durham, NC
Sacramento-Stockton-Modesto, CA
Salt Lake City, UT
San Antonio, TX
San Diego, CA
San Francisco-Oakland-San Jose, CA
Seattle-Tacoma, WA
St. Louis, MO
Tampa-St. Petersburg-Sarasota, FL
Washington, DC
West Palm Beach-Ft. Pierce, FL

Will I Need to Buy a New TV Again?

Here's the good news and bad news: No, you won't need to go out and buy a new TV right away … but without it, none of the new services will be available to you. The FCC and most world regulatory bodies have taken a market-based approach to 3.0. They are not mandating it with a hard implementation date as was taken with the initial digital conversion. Instead, stations wishing to broadcast in 3.0 must also maintain their 1.0 broadcast for now. Viewers won't notice much of a difference when local stations begin adding the new signal (although you might need to rescan your local channels on your TV). You can be sure that the stations will hype it constantly as the financial investment to begin the broadcasts in 3.0 is substantial.

What Will the New Standard Offer?

ATSC 3.0 is a collection of about 20 sub-standards. The benefits attributed to the new digital broadcasts are many. For starters, high efficiency compression of the video (HEVC) for video up to resolutions of 3840 x 2160p, 4K television at up to 120 frames per second, a wide color range, digital watermarking, improved audio with two optional standards (Dolby AC-4 and MPEG-H-3D), the ability to "datacast," and a few things that are based on the wider data such as targeted advertising and a more sophisticated emergency alert system. Better support for mobile devices is also promised.

Isn't This Going to Be Obsolete Soon, Too?

That's always a possibility with tests of 8K and higher resolutions already out there but in principle, the ability of 3.0 devices would include a "bootstrap" capability allowing for future changes. Time will tell how well and for how long that works. The FCC has indicated that it will neither require the installation of new tuners in new televisions nor will it offer any subsidy program for the industry and consumers.

What About Backward Compatibility?

Obviously, with so much video already available and very little in 4K and up, the standard must allow for dealing with lower resolution video (and it does). While the tuners for 1.0 can't receive 3.0 broadcasts, the 3.0 devices will receive video from 720 x 480 and up or in other words, the lowest levels of current HD video.

When Does it All Start?

Really soon now. On May 31, 2017, SBS, MBC, and KBS officially launched their full-time ATSC 3.0 services in major South Korean markets such as Seoul and Incheon. For U.S. viewers, the television industry expects between 20 and 40

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markets to have at least one local station broadcasting in 3.0 by the end of 2020[1]. The transition, as mandated by the FCC, requires that current "mandatory carry" rules for 1.0 remain in effect for the foreseeable future. You'll not lose your cable or OTA (over the air) feeds in the next year or two. Stations will be required to provide sufficient on-air notice about any change to services. Further, stations won't get a second channel for a gradual changeover. The FCC has said it recommends multiple broadcasters in each market co-locate ATSC 1.0 services on a single transmitter. Although many do this now, this might be a problem in smaller markets if owners can't agree. Simultaneously, broadcasters would need to share any remaining transmitters for 3.0. This might make for some strange "tower friends."

At some future point, ATSC 1.0 transmissions would end and stations could return to using their own transmitters. Issues might arise because of spectrum reallocation in some markets. In the past, voluntary transitions haven't always worked well. In this case, the National Association of Broadcasters (NAB) is behind it and there is one standard. What consumers will do remains to be seen.

You Don't Suppose This'll Be Done for Free…

TV stations are excited about the ability to add targeted advertising based on consumer locations or preferences, and the ability to add better warning notices. It also provides a "wake-up" capability if your device supports it so you won't miss warnings. The standard provides for data to be geolocation-specific which, along with other consumer data flowing from your smart TV, phone, and GPS receivers, could mean very targeted advertising (location, demographics, etc.) Like similar efforts, this might make some consumers wary.

The ability to specifically target weather, public safety, and emergency information to TVs only in very specific areas would clearly have more value to consumers. One recent demonstration was able to show the ability to air fire warnings to a single street had it been available during the recent "Camp Fire" in California.

In order to reduce fraudulent distribution, the 3.0 spec allows for digital watermarking. It does not appear that, at present, there is much attention being paid to this feature.

Audio: Your 12 channels or 3D?

The audio options for the standard include mono, stereo, and current surround sound for backward compatibility. However, the real excitement is for Dolby AC-4 and MPEG-H 3D audio. Dolby AC-4 is an evolution of current Dolby systems such as Dolby Digital Plus. AC-4 provides up to 5.1 audio channels (5 main speakers: Left and right front, left and right rear, and center) plus a bass speaker or subwoofer. All 3.0 TV tuners which support AC-4 must support 5.1 as a baseline. It also allows as an option for the delivery of 7.1.4 speaker systems (7 base speakers, one subwoofer, and 4 "height" or ceiling speakers). The good news is that AC-4 sound systems are already appearing on the market (at a price!).

The other option, H-3D, is more interesting. Its focus is to create the immersive experience or true 3D sound. Created by the MPEG organization and spearheaded by Fraunhofer, Technicolor, and Qualcomm, it allows for up to 64 speakers and 128 channels of audio. Sony has been an early adopter with the marketing name "360 Reality Audio" and the South Korea trade association has said that their 4K TVs will only support H-3D audio. South Korean manufacturers Kai Media and DS Broadcast will support it for studios and consumers. The Deezer and Tidal music streamers plan to add audio content to their services[2].

Can I Buy a TV to See It?

Yes … in South Korea. South Korea's regulators and industry have set ATSC 3.0 as the standard for ultra-high definition (UHD) broadcasting in the country. In 2017, LG Electronics announced that 4K TVs sold in South Korea would include ATSC 3.0 tuners. In the U.S., it looks as if it will be 2020 or 2021 before your favorite electronics retailer will have UHD compatible TVs for sale. Unless, of course, you want to import your own from South Korea.

The technology in the TV industry is moving rapidly. Buckle up and get out your wallet for the ride.

What's On Your Mind?

As always, I am happy to receive your comments, suggestions, and ideas. Feel free to reach out to me and share what you are thinking.

References:

1. <https://tinyurl.com/y2fug3fx>
2. <https://tinyurl.com/yy4zyov2>
3. <https://tinyurl.com/y58x2x9p>

Figure 2. Station Groups Planning to Deploy ATSC 3.0

Fox Television Stations
NBCUniversal Owned Television Stations
Univision
Spectrum Co (Sinclair Broadcast Group and Nexstar Media Group)
Pearl TV organization (Cox Media Group, The E.W. Scripps Company, Graham Media Group, Gray Television, Hearst Television Inc., Meredith Local Media Group, Nexstar Media Group, and TEGNA Inc).
America's Public Television Stations (APTS group)
Capitol Broadcasting
Hubbard Broadcasting
News-Press & Gazette Broadcasting, PBS stations in the Phoenix Model Market Next-Gen TV test.

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